



Request for Information DE-PS36-09GO39006

Date: January 15, 2009

Subject: Request for Information (RFI)

Description: The Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Hydrogen, Fuel Cells and Infrastructure Technologies Program is seeking feedback from the research community and stakeholders to assist in the development of a possible Funding Opportunity Announcement (FOA) for new Center(s) of Excellence to conduct research and development of hydrogen storage materials.

Program Contact/Area: Dr. Ned T. Stetson / Hydrogen, Fuel Cells and Infrastructure Technologies Program

Background:

On-board hydrogen storage for transportation applications continues to be one of the most technically challenging barriers to the widespread commercialization of hydrogen-fueled vehicles. The EERE hydrogen storage activity focuses primarily on the applied research and development (R&D) of low-pressure, materials-based technologies to allow for a driving range of more than 300 miles (500 km) while meeting packaging, cost, safety, and performance requirements to be competitive with current vehicles. While automakers have recently demonstrated progress with some prototype vehicles traveling more than 300 miles on a single fill, this driving range must be achievable across different vehicle models and without compromising space, performance or cost. The Program website and the Program Multi-Year Research and Development Plan contain further information on the Program and objectives.¹ In addition, technical progress reports from all projects currently funded by the Program can be found in the DOE Hydrogen Program Annual Progress Reports.²

Since FY 2005, the hydrogen storage effort has been conducted under the framework of the National Hydrogen Storage Project. It includes independent projects and Centers of Excellence (CoEs) in applied hydrogen storage R&D funded by DOE/EERE and basic research projects for hydrogen storage funded by the DOE Office of Science. A new effort getting underway in FY

¹ <http://www1.eere.energy.gov/hydrogenandfuelcells/storage/> and <http://www1.eere.energy.gov/hydrogenandfuelcells/mypp/pdfs/storage.pdf>

² http://www.hydrogen.energy.gov/annual_progress.html

2009 is the Hydrogen Storage Engineering CoE that will provide a coordinated approach to the engineering R&D of on-board materials-based systems. The Engineering CoE is planned as a five-year effort and may produce up to three sub-scale prototype systems (based upon the most promising materials under consideration) as its final output (subject to go/no-go decision points). Crosscutting efforts on system analysis and material chemical and environmental reactivity are also included in the National Hydrogen Storage Project. The three current materials development CoEs have been focused on specific hydrogen storage material classes: on-board reversible metal hydrides, hydrogen adsorbents, and chemical hydrogen storage materials (which are, in general, regenerated off the vehicle). These three materials-focused CoEs, which initially began in FY2005, are scheduled to conclude in FY 2010.

Purpose:

DOE is planning to continue applied R&D on advanced hydrogen storage materials for on-board vehicle applications. Hydrogen storage technology development for niche vehicles and stationary and portable power applications is also included in the Program's mission. DOE anticipates selecting one or more new materials-focused CoE(s) to start in FY 2010 as the current materials centers end, subject to appropriations. It is envisioned that the new CoE(s) will be able to build upon the progress that has been made through the existing portfolio of projects, and that the effort(s) will complement and coordinate with the Engineering CoE and program system analysis efforts. The primary mission of the new CoE(s) will be to research and develop improved hydrogen storage materials that have the potential to meet DOE's on-board hydrogen storage system targets.¹ The scope of the new CoE(s) may include consideration of scale-up of both material syntheses and off-board regeneration processes, and technologies enabling hydrogen storage for niche vehicles, stationary and portable power applications.

The purpose of this RFI is to gather feedback from the research community and stakeholders prior to DOE issuing the new Center of Excellence FOA. This RFI is not an FOA; therefore, DOE is not accepting applications at this time. DOE plans to issue a FOA in the future, providing approximately ninety to one-hundred twenty (90-120) calendar days for applicants to prepare and submit applications. Final details, including the anticipated award size, quantity, and timing of DOE-funded awards, will be subject to congressional appropriations and direction.

In the RFI Guidelines and Subject Areas that follow, DOE has outlined draft strategies for technical work scope and CoE structure and processes. It is expected that these strategies will be augmented and revised with the information received from this RFI.

RFI Guidelines:

Parties interested in submitting a response to this RFI should review the RFI Guidelines and the Subject Areas below in their entirety before developing and submitting a response. Responses to this RFI should address one or both of the Subject Areas below. Each addressed Subject Area should be in a delineated section of the response document. Responses should provide any arguments, observations, or recommendations that respondents consider relevant to the cited Subject Area.

DOE will review and consider all responses in its formulation of program strategies in the pursuant FOA. DOE will not reimburse costs associated with preparing any documents for this RFI and there is no guarantee that an FOA will be issued subsequent to this RFI.

Comments in response to this RFI must be provided as an attachment using Microsoft Word (.doc) format (maximum of 4 pages) to an e-mail message addressed to MaterialsCoE@go.doe.gov. All responses to this RFI must be delivered electronically to the aforementioned e-mail address. Please do not provide any information which may be considered proprietary or confidential.

Questions regarding the content of this RFI should be submitted through the “Submit Question” feature of the DOE Industry Interactive Procurement System (IIPS) at <http://e-center.doe.gov>.

Comments must be provided by no later than 11:59 PM EDT on February 6, 2009.

RFI Subject Areas:

DOE is asking the research community and stakeholders to provide input and feedback on the following areas:

Subject Area 1: The Use of the Center Concept and Center Structure & Processes

- Please provide comments and feedback on the pros and cons of using the Center of Excellence (CoE) collaborative approach rather than selecting individual projects.
- Comment on the appropriate timing (inception and duration) of the proposed materials CoEs given the current status of materials research and the need to meet DOE on-board storage system performance targets.
- Please provide comments and feedback on the number and area(s) of focus for new CoE(s), for instance:
 - Pros and cons of continuing with the current model of centers focused on specific material classes (e.g., on-board reversible metal hydrides, adsorbents and chemical hydrogen storage materials).
 - Pros and cons of having centers focused on on-board rechargeable materials and off-board regenerative materials, separately.
 - Pros and cons of utilizing one or more centers covering all types of material classes under consideration in the portfolio (e.g., team proposes a portfolio of materials to meet FOA requirements).
 - Any other recommended center structures for hydrogen storage material based R&D.
- Comment on realistic outcomes or deliverables from the next CoE(s) planned for a five-year duration.
- Comment on methods or requirements DOE may include in an FOA to ensure that the new CoE(s) builds upon work done by the existing centers and independent projects to date, considering the critical need to leverage existing know-how and to minimize loss of R&D momentum.

- Comment on the following issues related to teaming:
 - Pros and cons of DOE specifying a specific number or minimum/maximum number of partners and/or a mix of partners (e.g., university, industry, national laboratory) and/or mix of capabilities (e.g., computational, experimental, analytical, industrial experience).
 - Teaming format/scenario that you envision as the most helpful to foster collaboration and accelerate the achievement of the DOE hydrogen storage goals.
 - Whether DOE should request Intellectual Property (IP) and Non-Disclosure Agreements (NDA) agreed upon by each team member upfront to ensure effective collaboration and interfacing between center partners and with other centers and DOE efforts.
 - Other potential teaming hurdles (e.g., intellectual property management plans, material transfer agreements with the DOE Hydrogen Storage Engineering CoE, etc.) and how they may be mitigated beforehand by properly addressing them in the FOA.
- Comments related to CoE processes in general.

Assuming a Center of Excellence approach is used by DOE, please comment on the technical scope of work for the FOA.

Subject Area 2: Technical Scope of Work

- Pros and cons of including feasibility analysis for materials synthesis scale-up (e.g., from gram quantities to kilogram quantities and above, and/or batch synthesis to continuous processing) in the scope of work.
- Pros and cons of including scale-up of off-board chemical hydrogen storage regeneration processes (e.g., from gram to kilogram quantities per batch and development/transition of batch to continuous processes) in the scope of work.
- Comment on the inclusion of cost analyses addressing scale-up for material syntheses and regeneration processes for promising materials in the scope of work.
- Comment on requesting use of computational modeling tools and validation experiments for efficient, rapid discovery of potential candidate material systems.
- Comment on requesting use of high-throughput/combinatorial methodologies for rapid discovery and testing of potential candidate material systems.
- Comment on the benefit of including reactivity studies on handling and use of promising materials within the new CoE(s).
- Comment on the potential issues with providing large quantities of material (1 to 10 kg) developed in the new Material Center(s) to the Engineering Center for component and system prototype testing. Comment on any additional issues relating to this activity.
- Pros and cons of including niche vehicle, stationary and portable power applications as additional scope (e.g., material handling equipment [forklifts, airport luggage carts, etc.] and bulk storage at fueling stations) while maintaining focus on vehicular applications.
- Comment on any additional technical areas recommended for inclusion or exclusion in the work scope.